REMARKS/ARGUMENTS

This application has been carefully considered in light of the Non-Final Office Action of January 15, 2010.

Claims 1-6 remain in the application. Claims 1-6 have been amended to more clearly claim the subject matter of the applicant's claimed invention and to place the claims in proper US format. Even in light of these amendments no new matter has been included.

The Examiner is rejecting claims 1-6 under 35 U.S.C. 103(a) as obvious over Ishiguro (US Patent 4,967,127), in further view of Penkar (US Patent 4,773,025), and Gunnarsson (US Published Patent Application 2004/0093119).

In the applicant's claimed invention, the method as outlined in claim 1, employs a control of the displacement of the moving portion of the multi-axis robot. Movement setpoints (500) **along a path** (320) are calculated in order to **minimize the difference** between the projection (F_t) of the external force onto a tangent (T) of the path (320) and the projection of the force setpoint onto this tangent.

Furthermore, the apparatus of the applicant's claimed invention includes a **force estimator** (700) which can generate an external force signal (800), whereas a path generator (400)

calculates movement setpoints (500) in order to **minimize the same difference** between the projection (F_t) of the external force onto a tangent (T) of the path (320) and the projection of the force setpoint onto this tangent.

In other words, the applicant's claimed invention allows the robot to **keep the shape of the path by adapting the velocity** of the moving portion of the robot to the path.

The main reference, Ishiguro, discloses a robot which is adapted to **deviate** from a known path, as a function of a workpiece (W) to be treated, while respecting force setpoints. Therefore, the approach of Ishiguro does not consist of following a path while adapting some movement setpoints, such as speed and acceleration, in order to minimize a difference as in the applicant's claimed invention, but to **leave** this path when it would be too difficult to follow.

In Ishiguro, a CPU (301) modifies the interpolated data of the path points. In particular, the robot of Ishiguro is equipped with a mechanism for converting a displacement into a force. This mechanism includes, amongst others, a spring located between an arm end and a tool.

The reaction force of the workpiece (W) is measured, not computed. The path setpoint is modified to adapt the compression of the spring. The force modification is oriented along the

principle direction of the spring. This modification is thus essentially perpendicular to the path, since it corresponds to the displacement capacity of the spring. In other words, Ishiguro works on the compression rate of the spring, in order to modify an effort which is exerted along the axial direction of the spring, that is perpendicular to a tangent to the path. A modification of this effort is not noticeable on this tangent.

This modification is obtained by the CPU (301) which modifies the position setpoint Ptpath(KH1) which belongs to the path and which is obtained by interpolating the previously taught date (see column 6, second paragraph). The modified setpoint Ptmod(KH1) does not constitute a movement setpoint along the path.

In the applicant's claimed invention, the movement setpoints (600) computed by the path generator (400) are setpoints along the path (300).

Ishiguro does not compare a projection of an external force on a tangent to the path and a projection of a setpoint on this tangent. This is consistent with the fact that, in Ishiguro, one acts along the direction of the spring which is globally perpendicular to the path.

Thus, Ishiguro cannot anticipate the applicant's claimed invention.

Penkar, references using a sampling frequency for torque control unlike the applicant's claimed invention.

Gunnarsson, is directed to a control method based on a comparison between a reference path and an outcome path (para 0021). Gunnarsson considers a **distance** between a point of the reference path and the intersection between the outcome path and the plane including the point of the reference path and perpendicular to a tangent to the reference path.

Therefore, Gunnarsson works on a **minimization of a distance**, which is not the same as the minimization of a difference between the projection of a force and a force setpoint onto a tangent to the path. Moreover, Gunnarsson needs iteration (para 0029) of the method in order to efficient.

As outlined above it is respectfully stated Ishiguro does not anticipate the claims of the applicant's invention. Therefore, the combination of Ishiguro, Penkar and Gunnarsson would not render the applicant's claimed invention obvious. It is respectfully requested the rejection of the claims be removed and subsequent notice of allowance be issued.

An earnest effort has been made to place this application in condition for formal allowance. Should the Examiner have any questions regarding the allowability of the claims, it is requested that an interview be granted with applicant's

representative prior to taking any action that may be considered as final. Any fees necessitated by the filing of this response may be charged to Deposit Account 04-1577.

Respectfully submitted,
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